

34. This points to something anomalous in the centering of the eye surfaces. The amount and direction of the eccentricity in my eyes as shown by these means are in somewhat remarkable correspondence with those obtained by the entirely different method of Helmholtz ("Phys. Opt.," pp. 86, 87). I may add below the angles for my eyes corresponding to numbers given by Helmholtz, *loc. cit.* :—

	Light came from	
	Nasal side.	Temporal side.
Right eye.....	9° 27'	3° 49'
Left eye.....	7° 36'	7° 36'

35. One more observation of some interest I may record. With the sun as source of light and with a fixed direction of vision (I have generally taken that direction in which the ghost comes into the line of direct vision, so as to avoid the constant tendency of the eye to turn towards any object of interest in the field), the ghost passes through a series of forms as the state of accommodation alters. There are three marked forms, a horizontal bar with a near focus; a circle for a slightly more remote focus; and a vertical bar for long distance. There may be signs of a double astigmatism; but as they are the only signs that I have had of such defect in my eyesight, I have rejected this explanation in favour of the equally simple one, that we have here the focal lines and circle of least confusion such as are observed in oblique reflexion by a concave mirror.

The explanation suggested in this paper is attended with difficulties, the greatest of which is perhaps that referred to in § 27. It is, however, the one which on the whole explains best the greatest number of the facts to be accounted for. The calculations made on various points mentioned above are based on measurements given by Helmholtz for his schematic eye. It seems likely that individual variations from the normal eye should be such as to determine the visibility of the ghost; but I have found as yet no obvious relation in about fifteen cases between the power to see the ghost and the kind of sight, as defined by the ordinary terms, long and short sightedness. Two cases in which I have notably failed to show the ghost, are opposed in this respect, one having short sight, the other normal; whilst of those to whom the ghost is visible there are as many short sighted as long sighted.

III. "Note on the Absorption Spectrum of Iodine in Solution in Carbon Disulphide." By Captain ABNEY, R.E., F.R.S., and Lieut.-Colonel FESTING, R.E. Received January 18, 1883.

In 1876, Sir John Conroy ("Proc. Roy. Soc.," vol. 25, p. 46), described the absorption spectrum of a solution of iodine in carbon

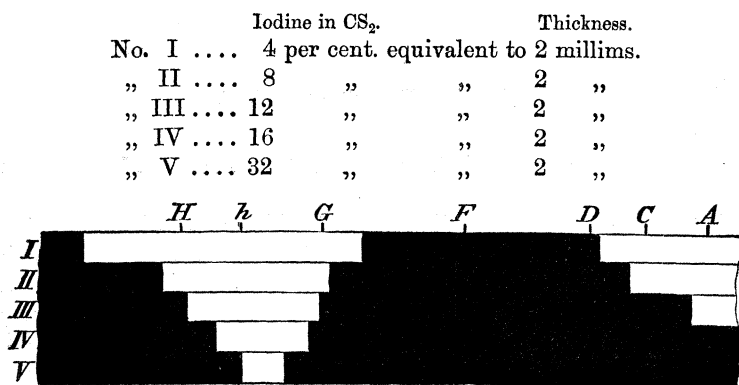
disulphide. He, however, solely regarded the visible spectrum from near B to above G, about wave-length 4,000.

Our attention was recently directed to the absorption of this substance, and we have determined photographically the spectra for different thicknesses and strengths of the solution.

Our inquiries into the behaviour of carbon disulphide had shown us that it, as well as iodine, was transparent for rays of very low refrangibility, as was first shown by Professor Tyndall. We are not aware, however, that any investigations into the absorption at the more refrangible end of the spectrum have been published. An idea seems to be prevalent that the absorption commences in the green, and gradually extends, as the thickness or density of the solution is increased, in both directions until finally all the visible rays are extinguished, leaving the invisible rays at both ends unabsorbed.

Though one of us employed the solution before to cut off the visible portion of the spectrum ("Phil. Trans.," Part II, 1880, p. 664) in diffraction photography of the lower part of the spectrum, the use of it was abandoned owing to the opinion that was expressed that instead of the infra-red being photographed, the ultra-violet and violet of the spectrum of the next order might be that which was really impressed. Our recent experiments, however, show that no fear need have been entertained on this account, as the annexed diagram will show.*

The following thicknesses and strengths of solution were employed, being placed before the slit of the photographic spectroscopie:—



The source of light was usually the crater of the positive pole of the electric lamp, though in two instances we were favoured with a glimpse of sunshine, which enabled us to confirm what we had before

* This diagram represents the absorption of the continuous spectrum. The bright bands in the electric light above K had power to penetrate the solutions II and III.

obtained with the less brilliant source of light. For Nos. I, II, and III, photographs were taken, which gave the red and infra-red spectrum, as well as the more refrangible end. With every number ordinary gelatin plates of great sensitiveness were employed as a check on the collodion plates. To the eye, the red, in each case, extends a trifle more towards D than in the photograph.

An attempt was made to produce the same range of photographic action in the spectrum of the thicker solutions as in the less dense, by increasing the time of exposure. The result, however, was abortive, and hence we may conclude that when any visible ray is quenched to sight by a solution of particular density, it also ceases to be photographically active.

The last ray to disappear in the blue lies somewhere close to h , and it will be seen that the ultra-violet rays are absorbed before the absorption touches the violet. By using a still denser solution than No. V, we were able to entirely quench the blue, both visually and photographically, while the extreme red was still visible, and the photograph taken showed no signs of absorption of the infra-red rays.

In conclusion we would remark, that by the use of this solution in a rock-salt cell and a grating, the infra-red spectrum from λ 7,600 to λ 15,200 may be photographed without the instrumental separation of the different orders of spectra; and the conditions of our climate are such that the atmospheric absorption usually, if not always, prevents a study of the solar spectrum below the greater wave-length above-named.

Presents, December 21, 1882.

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		Iodine in CS ₂ .		Thickness.	
No. I		4 per cent. equivalent to 2 millims.			
„ II		8	„ „	2	„
„ III		12	„ „	2	„
„ IV		16	„ „	2	„
„ V		32	„ „	2	„

